Chemical & Engineering NEWS

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Congressional Elections '80

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News of the Week

- ***Research ties*** *between industry and academe cemented by University of Massachusetts, Amherst, 13 corporations, and NSF in program for polymer research.* ***Page 4***
- ***Chlorofluorocarbons production*** *will be limited to current levels under rules to be issued by EPA.* ***Page 4***
- ***Maytansine,*** *cancer drug whose toxicity dose is more than 100 times as great as its therapeutic dose, has been synthesized by Harvard University team.* ***Page 5***
- ***Union Carbide will build*** *$150 million silicones plant of unspecified capacity at its South Charleston, W.Va., site.* ***Page 5***
- ***Killing cancer cells in the body*** *by directing antibodies to deliver highly radioactive iodine to the protein of tumor cells tested at Johns Hopkins.* ***Page 6***
- ***U.S. chemical companies*** *will retain their hydrocarbon raw material cost advantage over foreign firms through the early 1980's, consultant predicts.* ***Page 6***

Business

- ***U.S. chemical plant capacity use is down*** *to 66% from 81% a year ago as a result of an overall drop in production and a small gain in capacity.* ***Page 9***

International

- ***European chemical company executives*** *blame their own actions as well as those of the U.S. for declining profits, point up need for cooperation.* ***Page 11***

Government

- ***Congressional elections for 1980*** *could have far-reaching effects in Congress as a whole, and specific interest for the chemical community.* ***Page 14***

Science

- ***How photochemical systems transfer energy*** *studied using rigid molecules and single photon counting technique.* ***Page 18***

Technology

- ***Shunt currents,*** *which lower efficiency of electrochemical devices, can be eliminated by passing a separate current through the electrolyte.* ***Page 20***
- ***U.S.S.R.'s underground coal gasification*** *program, promising in the 1950's, has failed to meet expectations.* ***Page 21***
- ***Composite catalysts allow comethanation*** *of carbon monoxide and carbon dioxide in mixtures with hydrogen.* ***Page 21***

ACS News

- ***American Chemical Society plans*** *a series of seminar/workshops on lab and plant safety beginning Oct. 27.* ***Page 23***

Books

- ***Two recent books*** *indicting nuclear power technology's threat to health, safety, and freedom are reviewed and found biased and misleading.* ***Page 29***

Chemical capacity use down to 66%

A 9% overall production drop combines with 6% capacity gain to bring down use of U.S. chemical plant capacity sharply from 81% a year ago

William F. Fallwell, C&EN New York; Bruce F. Greek, C&EN Houston

After showing the first cracks amid a generally high performance at the end of 1979 (C&EN, April 14, page 11), capacity use at U.S. chemical plants sank like a stone in the first half of 1980.

At the beginning of the third quarter, overall production in 30 leading chemicals surveyed semiannually by C&EN was down to an unweighted average of 66% of nameplate capacity. Use of effective capacity declined to 72%. These levels could be the low point of the recession, since production seems to have firmed up since then.

These figures represent a breathtaking drop from the industry's profitable 81% overall use of nameplate capacity in third-quarter 1979 and at the turn of the year. Effective capacity use in these 30 chemicals was 88% both times.

Behind the capacity use averages lie two contributing factors. Plant capacity for these 30 chemicals combined rose 6% over the past year to a total of 512 billion lb. This expansion hurt as production dropped 9% to an annual rate of 362 billion lb. The result is the 66% capacity use rate early this summer.

For downstream polymers, the news is even worse. For a total of 11 thermoplastics and synthetic fibers surveyed by C&EN, use of combined nameplate capacity dropped to 65% in third-quarter 1980 from 84% a year ago and 83% at the end of 1979. Effective capacity use in polymers was 70% this summer compared to 91% a year ago and 89% at the end of the year.

In the polymers, nameplate plant capacity also rose 6% over the past year to a total of 43.5 billion lb.

Polymers' capacity use drops hard in thermoplastics

Billions of lb	Third-quarter 1980 Capacity nameplate	Third-quarter 1980 Capacity use Nameplate	Third-quarter 1980 Capacity use Effective	Third-quarter 1979 Capacity nameplate	Third-quarter 1979 Capacity use Nameplate	Third-quarter 1979 Capacity use Effective
Plastics						
Polyethylene, low-density	9.0	62%	67%	8.5	92%	99%
Polyvinyl chloride	7.8	49	57	7.1	87	101
Polyethylene, high-density	6.2	58	61	5.5	95	100
Polystyrene	5.4	48	56	5.3	74	86
Polypropylene	5.4	52	58	5.0	80	89
Synthetic fibers						
Filament yarn						
Polyester	2.1	64	68	2.1	78	83
Nylon	2.1	64	68	2.0	85	90
Olefin	0.93	67	71	0.94	66	70
Staple						
Polyester	2.7	92	98	2.6	92	98
Nylon	1.0	77	82	1.0	91	97
Acrylic	0.85	83	88	0.85	84	89
AVERAGE		**65%**	**70%**		**84%**	**91%**

Sources: Industry sources, Textile Economics Bureau, Society of the Plastics Industry, C&EN estimates

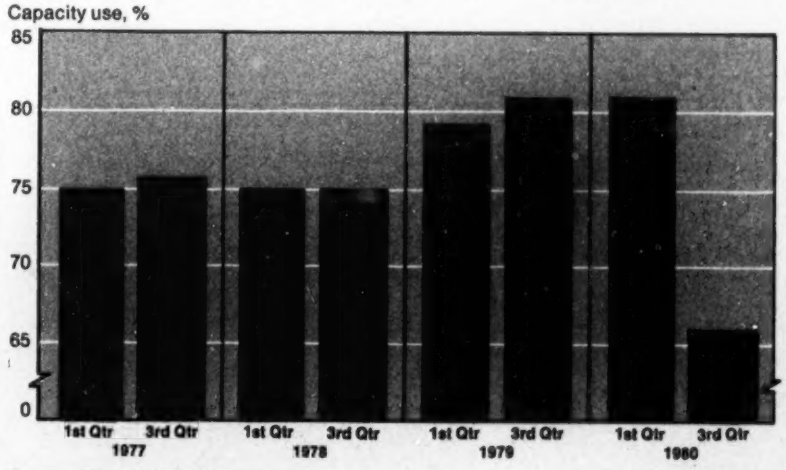
Meanwhile, output fell 27%, leading to the big drop in capacity use.

C&EN's overall findings in the production collapse of these polymers and chemicals agree closely with government production indexes over the past year. For example, the Federal Reserve Board figures show a 9% drop in the production index for basic chemicals from July 1979 to July 1980, and a 28% drop in polymers.

The government has no corresponding capacity or capacity-use figures. Although it can't be a surprise that capacity has gained somewhat and capacity use has slumped, the exact extent of both changes can be found only in a product-by-product analysis with the extensive help of industry sources.

Such a product run-through discloses an astonishing range of plant

Nameplate capacity use is way down from early 1980



Sources: Industry and C&EN estimates

Plant use drop from 1979 runs nearly across the board

Billions of lb per year unless otherwise noted[a]	Third-quarter 1980 Capacity nameplate	Third-quarter 1980 Capacity use Nameplate	Third-quarter 1980 Capacity use Effective	Third-quarter 1979 Capacity nameplate	Third-quarter 1979 Capacity use Nameplate	Third-quarter 1979 Capacity use Effective
Oil-based petrochemicals						
Ethylene	40.0	63%	70%	36.5	89%	99%
Propylene (chemical)	23.7	48	53	20.5	72	80
Butadiene[b]	4.0	65	72	4.0	90	100
Benzene (bg)	2.4	64	70	2.3	77	84
***p*-Xylene**	5.6	68	72	5.7	79	88
Natural gas-based petrochemicals						
Methanol (bg)	1.4	80	89	1.4	85	94
Formaldehyde (37% solution)	8.6	59	62	9.1	74	78
Ammonia (mt)[c]	24.0	75	79	20.4	91	96
Urea (mt)[c]	8.0	91	101	7.5	87	97
Chlor-alkalies						
Chlorine (mt)	14.6	69	73	14.4	88	93
Caustic soda (mt)	15.3	68	72	15.1	85	90
Soda ash (mt)	9.7	79	83	9.1	92	97
Acids						
Sulfuric (mt)	58.0	76	80	56.0	81	85
Phosphoric (P_2O_5, mt)	11.7	87	92	9.8	94	99
Industrial gases						
Oxygen, **Nitrogen** (total, liquid, ttd)	33.6	69	85	31.2	67	83
Carbon dioxide (ttd)	15.6	68	77	12.5	52	62
Mineral-based inorganics						
Sulfur (Frasch, mlt)	14.5	72	—	14.1	76	—
Phosphorus (mt)	0.55	70	74	0.55	78	85
Plastics monomers						
Styrene	8.9	55	58	8.4	89	94
Vinyl chloride	8.2	63	70	8.4	99	109
Propylene oxide	2.7	48	53	3.0	83	92
Fiber monomers						
DMT/PTA[d]	7.3	59	69	7.3	81	95
Ethylene oxide	6.6	70	78	6.5	78	82
Cyclohexane	3.4	52	55	3.2	78	83
Adhesives and coatings monomers						
Phenol	3.7	65	72	3.5	80	89
Vinyl acetate	2.5	68	72	2.4	83	87
Pigments						
Carbon black	3.7	61	68	4.3	73	85
Titanium dioxide (mt)	1.0	66	73	0.88	88	98
Solvents						
Ethanol (mg)	270	69	73	270	74	78
1,1,1-Trichloroethane	1.3	44	49	1.1	55	61
AVERAGE		**66%**	**72%**		**81%**	**88%**

a bg = billions of gal, mt = millions of tons, ttd = thousands of tons per day, mlt = millions of long tons, mg = millions of gal. b Based on extraction capacity of steam-cracking plants and dehydrogenation capacity only of dehydrogenation producers; could be more if extraction capacity of dehydrogenation plants were included. c Some capacity probably still shut down, less than 15% for ammonia and less than 5% for urea. d Dimethyl terephthalate plus purified terephthalic acid, not including acid converted to DMT. **Sources:** Industry and government sources, C&EN estimates

C&EN's capacity use indicator—the ground rules

Capacity use at chemical plants is difficult to measure and requires certain assumptions to bring some order to the maze of variables affecting this critical indicator of the industry's health.

With the help of industry and government sources, C&EN measures capacity use as a percentage of both nameplate and effective maximums. Nameplate capacity is the official design capacity of plants at nonstop use all year. Effective capacity is the practical maximum capacity after reductions for regular maintenance shutdowns and changes in product mix. Effective capacity runs from 85 to 95% of nameplate for most chemicals.

Capacity use is given semiannually over a calendar quarter, with no seasonal adjustment. The figures include plants actually running. Figures exclude new plants just starting up and old plants knocked out for long periods by accidents or mothballing. As much as possible, capacity figures stay current with expansions and debottlenecking.

Capacity figures do not take into account temporary fluctuations for fuel and electric power interruptions, equipment failure, and feedstock scarcity or substitution. The feedstock variables were especially important in 1979, further reducing maximum output for a number of important products.

Products in C&EN's capacity use survey are the same as those in the Key Chemicals and Key Polymers series. These are the core products of the industry, the basis for downstream production of thousands of more specialized products.

use levels in various areas. In third-quarter 1980, nameplate capacity use in chemicals ran all the way from 91% in urea to 44% in 1,1,1-trichloroethane. In polymers, the range was from 92% in polyester staple to 48% in polystyrene.

A glance through various product groups shows that organics and downstream thermoplastics got the worst of it in this year's recession. By contrast, inorganics, especially those related to fertilizer, made it to the third quarter with much less damage.

The worst was certainly in basic petrochemicals and downstream plastics. The five basic olefins and aromatics in C&EN's survey suffered a combined production drop of 21% over the past year while capacity rose 9%. Nameplate capacity use this summer sank to 62% from 81% a year ago.

A look at thermoplastics, the biggest outlet for these chemicals, shows why. Thermoplastics output fell 32% in third-quarter 1980 from third-quarter 1979, while capacity climbed 8%. The result was that capacity use slid from 86% to 54%.

Among various inorganics, capacity use is more mixed. To start with a negative, the chlor-alkalies held up against the recession until the third quarter this year, but then took a dive. Production in chlorine, caustic soda, and soda ash was down 17% this summer from a year ago, while capacity edged up 3%. Capacity use fell to 72% from a robust 88% in third-quarter 1979.

On the other hand, the big-volume acids, sulfuric and phosphoric, enjoyed about the same production volume in third-quarter 1980 as last year's third quarter, but issuing from 6% more capacity. Such health, due largely to phosphate fertilizer exports, kept capacity use of these acids at 82%, compared to 88% a year ago. □

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